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EXAMINER	
HANDAL, KAITY V	

ART UNIT	PAPER NUMBER
1764	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/006,963	KRAUSE ET AL.	
	Examiner	Art Unit	
	Kaity Handal	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-46 is/are pending in the application.

4a) Of the above claim(s) 31-46 is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-30 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) 1-46 are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date July 10, 2002, July 19, 2002, July 29, 2002
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claim 1-30, drawn to apparatus, classified in class 422, subclass 190.

II. Claim 31-, drawn to method, classified in class 423 , subclass 647.7.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions Group I and Group II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the process as claimed can be practiced by another materially different apparatus, one which does not have a desulfurization module.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

4. Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

5. During a telephone conversation with Frank Turner on 6/21/2005 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-30. Affirmation of this election must be made by applicant in replying to this Office action.

Claim 30-46 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

6. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections – 35 U.S.C 112, Second Paragraph

7. Claim 16 recites in line 5 the limitation of "the desulfurization agent." There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections – 35 U.S.C. § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1, 2, 8, 9 are rejected under U.S.C. 102(e) as being anticipated by Han et al. (U.S Pat. No. 6,896,709 B1).

With respect to claim 1, Han et al. teaches an apparatus for converting hydrocarbon fuel into a hydrogen rich gas (Fig. 3), comprising a plurality of modules (col. 1, lines 1-3) stacked end-to-end along a common axis, wherein each module of the plurality of modules includes: a shell (10) having an interior space defining a passageway (17) for the flow of a gas stream from a first end of the shell to a second end of the shell opposite the first end, and a processing core (7) being contained within the interior space for effecting a chemical, thermal, or physical change to the gas stream passing axially through.

With respect to claim 2, Han teaches a reactor wherein the plurality of modules is cylindrical in shape (fig. 3) (col. 3, line 36-37).

With respect to claim 8, Han teaches a reactor wherein the plurality of modules includes a first module, wherein the processing core of the first module includes a partial oxidation catalyst (5) (col. 5, lines 27-28).

With respect to claim 9, Han teaches a reactor wherein the first module also includes a steam reforming catalyst (3) (col. 5, lines 7-8).

10. Claims 1, and 17-19 are rejected under U.S.C. 102(b) as being anticipated by Abe et al. (U.S Pat. No. 6,576,203 B2).

With respect to claim 1, Abe et al. teaches an apparatus for converting hydrocarbon fuel into a hydrogen rich gas (fig. 3), comprising a plurality of modules (61 & 62) (col. 5, lines 40-42) stacked end-to-end along a common axis, wherein each module of the plurality of modules includes: a shell (63) having an interior space

defining a passageway for the flow of a gas stream from a first end (65) of the shell to a second end (63) of the shell (63) opposite the first end (65), and a processing core being contained within the interior space for effecting a chemical, thermal, or physical change to the gas stream passing axially through (col. 8, lines 27-34).

With respect to claim 17, Abe teaches a plurality of modules wherein at least one module includes an inert material (col.11, lines 16-20).

With respect to claim 18, Abe teaches an inert material comprising ceramic beads (col. 11, lines 10-16).

With respect to claim 19, Abe teaches a module with an inlet (65) introducing reactive fluid (A) (col. 8, line 32). Water being material worked upon, it does not limit the apparatus claims. MPEP 2115.

Claim Rejections – 35 U.S.C. § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Han et al. (U.S Pat. No. 6,896,709 B1), as applied to claims 1 above, and further in view of Nishida et al. (U.S. Pat. No. 5,387,399).

Han discloses all of the claim limitations as set forth above but Han fails to disclose wherein each module of the plurality of modules includes an annular lip at either the first end or the second end of the shell and an annular recessed portion at the opposite end of the shell, and wherein the annular lip of one module is receivable into the annular recess of the adjacent module.

Nishida teaches a catalytic combustion reactor defined by a cylindrical housing (fig. 1, 3) which contains a plurality of modules (5) (col. 5, lines 52 – 61), wherein each module includes an annular lip at either the first end or the second end of the shell (3) and an annular recessed portion (S) at the opposite end of the shell, and wherein the annular lip of one module is receivable into the annular recess of the adjacent module in order to allow thermal expansion and avoid thermal stress (col. 4, lines 45-50).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in each module an annular lip at either the first end or the second end of the shell and an annular recessed portion at the opposite end of the shell, and wherein the annular lip of one module is receivable into the annular recess of the adjacent module in order to allow thermal expansion and avoid thermal stress.

13. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Han et al. (U.S Pat. No. 6,896,709 B1), as applied to claims 1 above, and further in view of Skala et al. (U.S. Pat. No. 6,238,815 B1).

With respect to claims 5-7, Han discloses all of the claim limitations as set forth above but Han fails to disclose a module wherein at least one module includes a porous support member, for example a screen, mounted in proximity to the first and second end of the shell.

Skala teaches an integrated reformer wherein the second reactor module (fig. 3, 46) having a pair (86 and 88) of screen support members mounted in proximity to the first and second end of the shell in order to allow the heat transfer medium to pass through while preventing the catalyst beads from escaping the module.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a pair of screen support members mounted in proximity to the first and second end of the shell, as taught by Skala, in Han's reactor in order to allow the heat transfer medium to pass through while preventing the catalyst beads from escaping the module.

14. Claims 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Han et al. (U.S Pat. No. 6,896,709 B1), as applied to claims 1, 8 and 9 above, and further in view of Clawson et al. (U.S. Pat. No. 6,126,908).

With respect to claims 10-13, Han discloses all of the claim limitations as set forth above but Han fails to disclose a catalyst from a catalyst group consisting of platinum, palladium, rhodium, ruthenium, iridium, nickel, potassium, and combinations thereof; and respective support material consisting of magnesia, alumina, silica, zirconia, and magnesium aluminate.

Clawson teaches a reactor for converting hydrocarbon fuel into hydrogen using examples of suitable reforming catalysts consisting of platinum, palladium, rhodium, ruthenium, iridium, nickel, potassium, and combinations thereof. Clawson further teaches examples of refractory carriers/support materials consisting of magnesia, alumina, silica, zirconia, and magnesium aluminate (col. 7, lines 45-54). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide any one of the conventionally known catalysts and a respective support material, as taught by Clawson, in Han's reactor in order to carry out a reforming reaction.

15. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Han et al. (U.S Pat. No. 6,896,709 B1), as applied to claim 1 above, and further in view of Clawson et al. (U.S. Pat. No. 6,468,480 B1).

With respect to claim 15, Han discloses all of the claim limitations as set forth above but Han fails to disclose a module wherein the processing core includes a deulfurizing agent.

Clawson teaches a reformer wherein the processing core includes a desulfurizing agent in order to reduce the amount of hydrogen sulfide in the gas stream to a concentration of about one part per million or less.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a deulfurizing agent in the processing core of the reformer module, as taught by Clawson, in Han's reactor in order to reduce the

amount of hydrogen sulfide in the gas stream to a concentration of about one part per million or less.

16. Claims 4, 14, 20, 25, 26, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Han et al. (U.S Pat. No. 6,896,709 B1), as applied to claims 1 above, and further in view of Gonjo et al. (U.S. Pat. No. 6,159,434).

With respect to claim 4, Han discloses all of the claim limitations as set forth above but Han fails to disclose a module wherein at least one module of the plurality of modules includes an annular layer of thermally insulative material disposed between the shell and the respective processing core.

Gonjo teaches a plate reformer having a plurality of modules that include an annular layer of thermally insulative material (fig. 9) disposed between the shell and the respective processing core in order to reduce heat loss from side surfaces (col. 29, lines 15-18).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a thermally insulative material disposed between the shell and the respective processing core, as taught by Gonjo, in Han's reactor in order to reduce heat loss from side surfaces.

With respect to claim 20, Han discloses all of the claim limitations as set forth above but Han fails to disclose a module wherein the processing core includes a water gas shift catalyst bed, and a heat exchanger positioned within the water gas shift catalyst bed.

Gonjo teaches a plate reformer having plurality of modules, one of which has a processing core which includes water gas shift catalyst bed (fig. 11, 38), and a heat exchanger (27) positioned within the water gas shift catalyst bed in order to convert carbon monoxide and steam of reformed gases to carbon dioxide and hydrogen (col. 19, lines 39-47).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a module wherein the processing core includes water gas shift catalyst bed, and a heat exchanger positioned within the water gas shift catalyst bed, taught by Gonjo, in Han's reactor in order to convert carbon monoxide and steam of reformed gases to carbon dioxide and hydrogen.

With respect to claims 14 and 25, Han discloses all of the claim limitations as set forth above but Han fails to disclose a module wherein the processing core includes a heat exchanger.

Gonjo teaches a plate reformer having modules, one of which includes a heat exchanger (fig. 1A, 7a) in order to recover heat and supply the amount necessary to other parts of the reforming process. (col. 15, line 22-24).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a module wherein the processing core includes a heat exchanger, as taught by Gonjo, in Han's reactor in order to recover heat and supply the amount thereof necessary to other parts of the reforming process.

With respect to claim 26, Han discloses all of the claim limitations as set forth above but Han fails to disclose a module wherein the processing core includes a carbon monoxide oxidation bed, a heat exchanger, and oxidation catalyst.

Gonjo teaches a plate reformer having modules, one of which includes a carbon monoxide oxidation catalyst bed (fig. 13, 5), and a heat exchanger (fig. 4, 27) positioned within the carbon monoxide oxidation catalyst bed (5) (col. 14, lines 3-7) in order to reduce the concentration of carbon monoxide to less than the allowable level of a fuel cell (col. 11, lines 40-43). Gonjo teaches the exchanger within the carbon monoxide oxidation in order to provide the temperature distribution suitable for the carbon monoxide oxidation reaction (col. 11, lines 33-40).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a module wherein the processing core includes a carbon monoxide oxidation module, taught by Gonjo, in Han's reactor in order to reduce the concentration of carbon monoxide to less than the allowable level of a fuel cell.

With respect to claim 27, Han discloses all of the claim limitations as set forth above but Han fails to disclose a module wherein an oxygen containing stream is introduced to the gas stream prior to contact with the carbon monoxide oxidation bed.

Gonjo teaches a plate reformer having a carbon monoxide oxidation bed wherein an oxygen/air containing stream is introduced to the reformed gases stream prior to contact with the carbon monoxide oxidation bed in order to provide a higher oxygen

concentration at the inlet of the carbon monoxide oxidation stage, thereby effectively oxidizing the carbon monoxide present in the reformed gases (col. 23, lines 28-52).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a module wherein an oxygen containing stream is introduced to the gas stream prior to contact with the carbon monoxide oxidation bed, as taught by Gonjo, in Han's reactor, in order to effectively oxidize the carbon monoxide present in the reformed gases.

17. Claims 16 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Han et al. (U.S Pat. No. 6,896,709 B1), as applied to claims 1, and in view of Gonjo et al. (U.S. Pat. No. 6,159,434), as applied to claims 14 and 20 above, and further in view of Clawson et al. (U.S. Pat. No. 6,468,480 B1).

With respect to claim 16, Han discloses all of the claim limitations as set forth above but Han fails to disclose a module wherein the processing core with a desulfurizing agent which includes zinc oxide.

Clawson teaches a reformer wherein the processing core (fig. 1, 71) with a desulfurizing agent which includes zinc oxide in order to reduce the amount of hydrogen sulfide in the gas stream to a concentration of about one part per million or less (col 4, lines 58-61).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the desulfurizing agent of Clawson in the processing

core of the reformer module of Han in order to reduce the amount of hydrogen sulfide in the gas stream to a concentration of about one part per million or less.

With respect to claim 21, Gonjo discloses all of the claim limitations as set forth above but fails to disclose a module wherein the processing core includes a low temperature water gas shift catalyst.

Clawson teaches a reformer wherein the catalyst used in the low temperature shift zone is a low temperature water gas shift catalyst (fig.1, 84) in order to reduce carbon monoxide to a level of less than about one percent, by volume, or below (col. 5, 1-5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a module wherein the processing core includes a low temperature water gas shift catalyst, as taught by Clawson, in Han's reactor in order to reduce carbon monoxide to a level of less than about one percent, by volume, or below.

With respect to claim 22, Han discloses all of the claim limitations as set forth above but Han fails to disclose the low temperature water gas shift catalyst group.

Clawson teaches a reactor for converting hydrocarbon fuel into hydrogen using examples of suitable low temperature water gas shift catalysts consisting of copper, copper oxide, zinc, platinum, rhenium, palladium, rhodium, and gold (col. 5, lines 5-15).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide any one of the known suitable catalysts, as taught by

Clawson, in Han's reactor in order to carry out a low temperature water gas shift reaction.

With respect to claim 23, Gonjo discloses all of the claim limitations as set forth above but fails to disclose a module wherein the processing core includes a high temperature water gas shift catalyst.

Clawson teaches a reformer wherein the catalyst used in the high temperature shift zone is a high temperature water gas shift catalyst (fig.1, 66) (col. 4, lines 39-40) in order to allow the apparatus to be more compact and lighter in weight than if only a low temperature shift catalyst is used (col. 3, 4-6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a module wherein the processing core includes a high temperature water gas shift catalyst, as taught by Clawson, in Han's reactor in order to allow the apparatus to be more compact and lighter in weight than if only a low temperature shift catalyst is used.

With respect to claim 24, Han discloses all of the claim limitations as set forth above but Han fails to disclose the high temperature water gas shift catalyst group.

Clawson teaches a reactor for converting hydrocarbon fuel into hydrogen using examples of suitable high temperature water gas shift catalysts consisting of ferric oxide, chromic oxide, copper, iron silicide, platinum, and palladium (col. 4, lines 33-39).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide any one of the known suitable catalysts, as taught by

Clawson, in Han's reactor in order to carry out a high temperature water gas shift reaction.

18. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Han et al. (U.S Pat. No. 6,896,709 B1) in view of Gonjo (U.S. Pat. No. 6,159,434), as applied to claim 26 above, and further in view of Dandekar et al. (U.S. Pat. No. 6,180,846 B1).

With respect to claim 28, Han as modified by Gonjo discloses all of the claim limitations as set forth above but Gonjo fails to disclose wherein said carbon monoxide oxidation catalyst bed includes a material selected from the group consisting of platinum, palladium, iron, chromium, manganese, iron oxide, chromium oxide, manganese oxide, ruthenium, gold and any combination thereof.

Dandekar teaches that conventional reforming catalysts are made up from metals of Group VIII and VI of the Periodic System and/or oxides thereof (col. 8, lines 57-63). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide any one of the conventionally known catalysts from metal Groups taught by Dandekar in Han's modified reactor in order to carry out a reforming reaction.

19. Claim 29 is rejected under 35 U.S.C. 103(b) as being unpatentable over Gonjo et al. (U.S. Pat. No. 6,159,434), and in view of Clawson et al. (U.S. Pat. No. 6,468,480 B1), and further in view of Abe et al. (U.S Pat. No. 6,576,203 B2).

Gonjo teaches an apparatus for converting hydrocarbon fuel into a hydrogen rich gas (fig. 1 A), comprising a plurality of modules stacked end-to-end along a common axis; wherein each module of the plurality of modules includes: a shell in the form of an annular layer of thermally insulative material disposed around the respective processing core (col. 29, lines 15-16) having an interior space defining a passageway for the flow of a gas stream from a first end (1) of the shell to a second end (6b) of the shell opposite the first end, and a processing core being contained within the interior space for effecting a chemical, thermal, or physical change to the gas stream passing axially there through and wherein the plurality of modules includes: a first module containing a partial oxidation catalyst bed (6a), followed by a module containing a heat exchanger for cooling (7b), followed by a module containing a water gas shift catalyst bed (4a), followed by a module containing a heat exchanger (7a), and finally followed by a module containing a carbon monoxide oxidation catalyst bed (5).

Gonjo fails to teach a module positioned adjacent to the shift module (4a) containing an inert material. Abe discloses a reformer which comprises an inert material in order to carry the catalyst components (col. 11, lines 16-20).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a module containing an inert material, as taught by Abe, in Gonjo's reactor in order to carry the catalyst components.

Gonjo fails to show a desulfurizer module containing a desulfurization agent positioned between the first heat exchanger (7b), and the shift module (4a). Clawson discloses a reformer apparatus which includes a desulfurizing agent (71) located

between a heat exchanger (58) and a shift reaction (84) in order to reduce the amount of hydrogen sulfide in the gas stream to a concentration of about one part per million or less (col. 4, lines 58-61).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a desulfurizing agent between the first heat exchanger (7b) and shift module (4a) of Gonjo's reformer module, as taught by Clawson, in order to reduce the amount of hydrogen sulfide in the gas stream to a concentration of about one part per million or less.

Claim 30 is rejected under 35 U.S.C. 103(b) as being unpatentable over Gonjo et al. (U.S. Pat. No. 6,159,434), and further in view of Clawson et al. (U.S. Pat. No. 6,468,480 B1).

Gonjo teaches an apparatus for converting hydrocarbon fuel into a hydrogen rich gas (fig. 1 A), comprising a plurality of modules stacked end-to-end along a common axis; wherein each module of the plurality of modules includes: a shell in the form of an annular layer of thermally insulative material disposed around the respective processing core (col. 29, lines 15-16) having an interior space defining a passageway for the flow of a gas stream from a first end (1) of the shell to a second end (6b) of the shell opposite the first end, and a processing core being contained within the interior space for effecting a chemical, thermal, or physical change to the gas stream passing axially there through and wherein the plurality of modules includes: a first module containing a partial oxidation catalyst bed (6a), followed by a module containing a

heat exchanger for cooling (7b), followed by a module containing a water gas shift catalyst bed (4a), followed by a module containing a heat exchanger (7a), and finally followed by a module containing a carbon monoxide oxidation catalyst bed (5).

Gonjo fails to show a desulfurizer module containing a desulfurization agent positioned between the first heat exchanger (7b), and the shift module (4a). Clawson discloses a reformer apparatus which includes a desulfurizing agent (71) located between a heat exchanger (58) and a shift reaction (84) in order to reduce the amount of hydrogen sulfide in the gas stream to a concentration of about one part per million or less (col. 4, lines 58-61).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a desulfurizing agent between the first heat exchanger (7b) and shift module (4a) of Gonjo's reformer module, as taught by Clawson, in order to reduce the amount of hydrogen sulfide in the gas stream to a concentration of about one part per million or less.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaity Handal whose telephone number is (571) 272-8520. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KH

6/27/05

ALEXA DOROSHENK
PRIMARY EXAMINER